

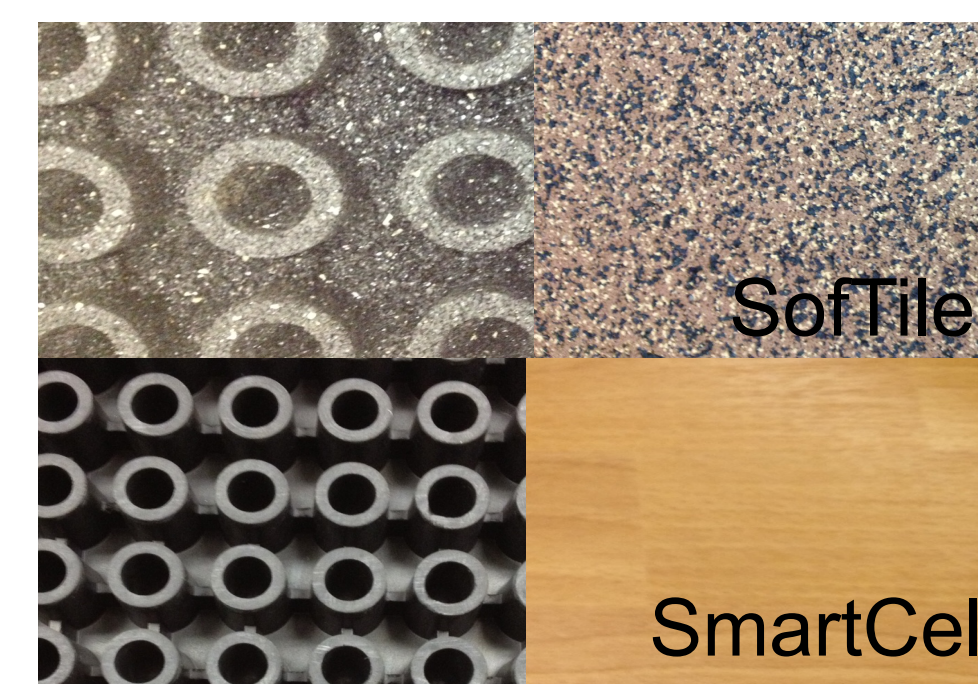
Effect of Compliant Flooring on Postural Stability in an Older Adult Population

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MOTIVATION

- One out of three adults age 65+ fall each year [1]
- 1800 deaths from falls annually [2]
- Often not all risk factors can be reduced or eliminated
- Hip fracture most serious consequence of falling [3]
- With poor adherence wearing hip protectors, modifying the bedroom/environment rather than individual is one way to reduce risk from falls
- Compliant flooring reduces femoral impact by up to 50% [4]
- Two commercially-made compliant floors have been identified as a passive intervention approach that may protect against fall-related injuries [4]



OBJECTIVE

- Confirm and extend previous quiet standing findings.
- Examine the effect of compliant flooring on postural stability during more dynamic, functional movements.

HYPOTHESIS

- Compliant flooring will display a significant increase ($p < 0.05$) in postural stability as compared to traditional flooring.

METHODS

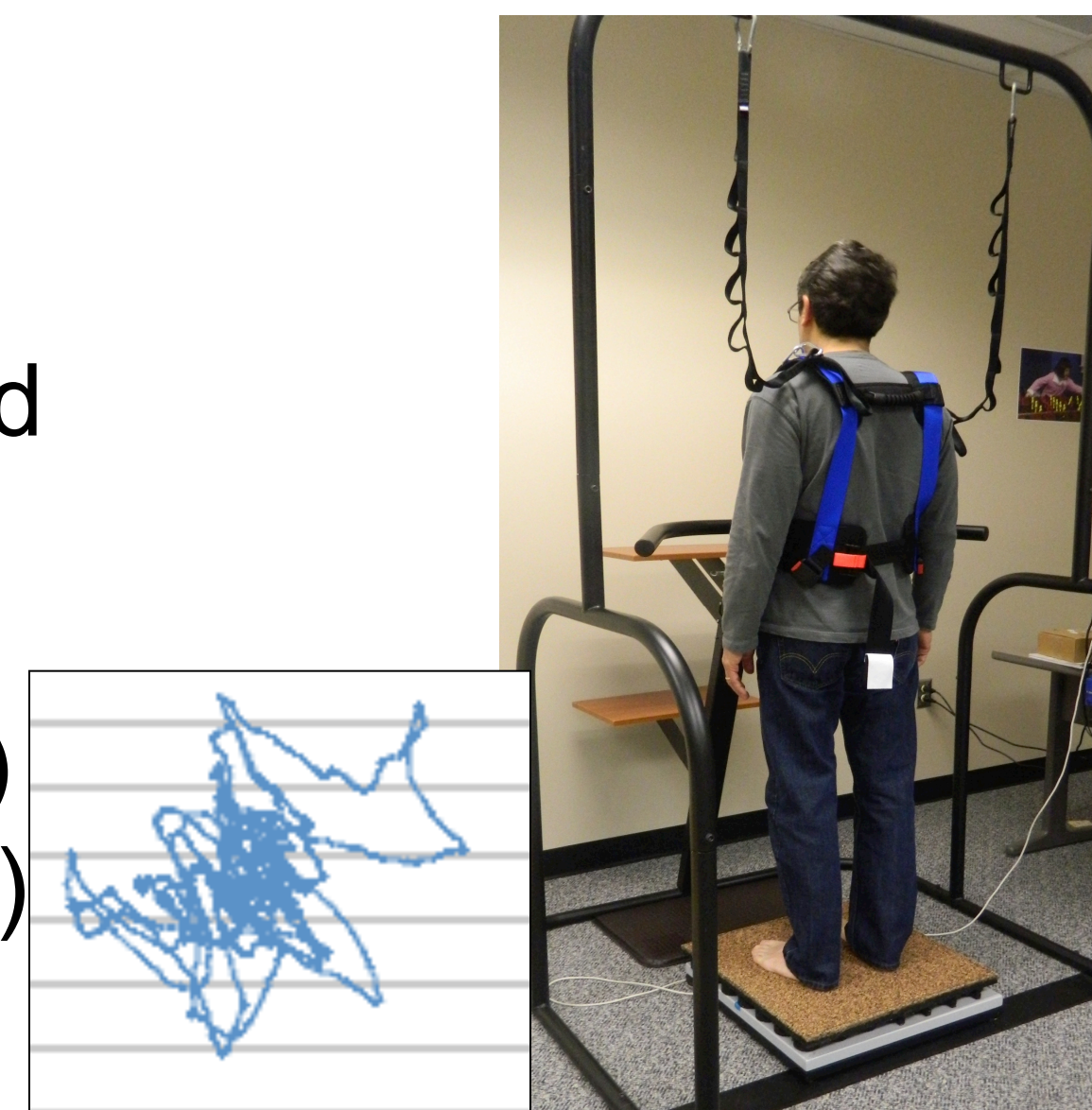
SUBJECTS

- 10 healthy older adults, 5 male, 5 female, mean age 66.2 ± 4.9 years
 - 10 Older Adults with Parkinson's Disease, 5 male, 5 female, mean age 66.3 ± 4.9 years
- (Higher Fall Risk: Resting tremor, slow movement, rigidity, postural instability, freezing)

STATIC TESTING PROTOCOL

Two 30 second trials were conducted barefoot on a balance plate while wearing a full body harness:

- Flat Plate (Eyes open and closed)
- SmartCell (Eyes open and closed)
- SoTile (Eyes open and closed)



METHODS CONTINUED...

IMMEDIATE STABILITY PROTOCOL

Adopted from the Berg Balance Scale:

- Sit to Stand
- Forward Reach (Object Retrieval)

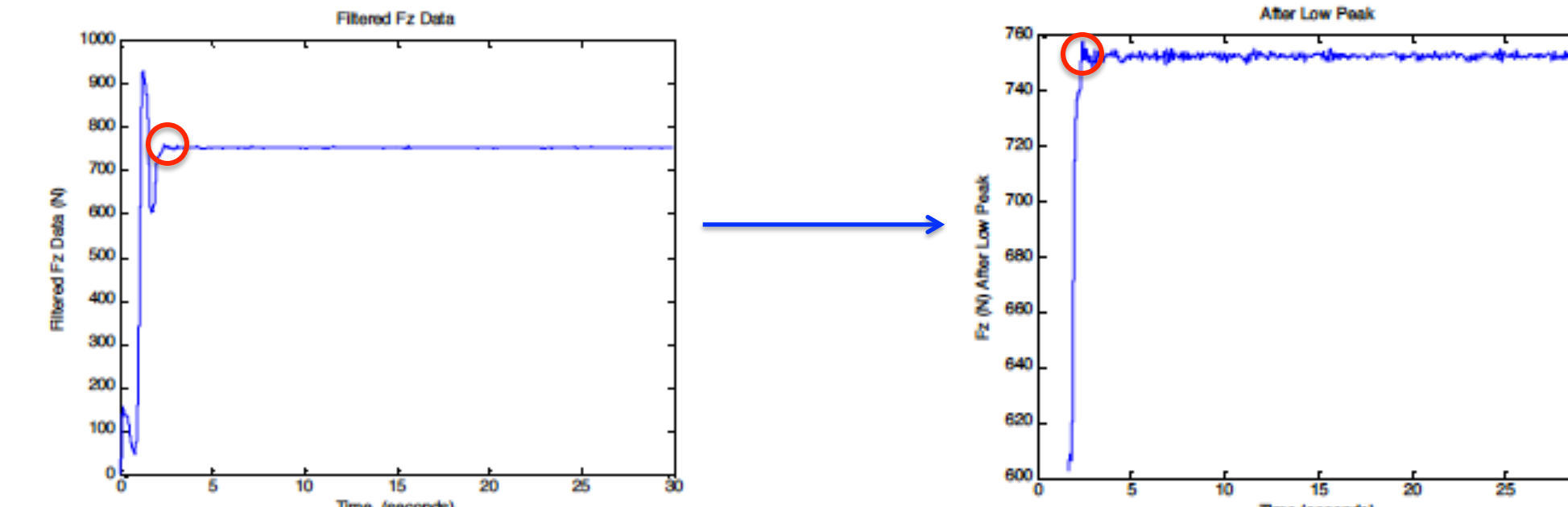


STATIC ANALYSIS

- A/P Sway Range, M/L Sway Range, Mean Velocity, Area of 95% Confidence Ellipse

IMMEDIATE STABILITY ANALYSIS

- Immediate 10 seconds of data following T_0 was analyzed
 - A/P Sway Range, M/L Sway Range, Mean Velocity, Area of 95% Confidence Ellipse



Red circles indicate approximately where T_0 was found

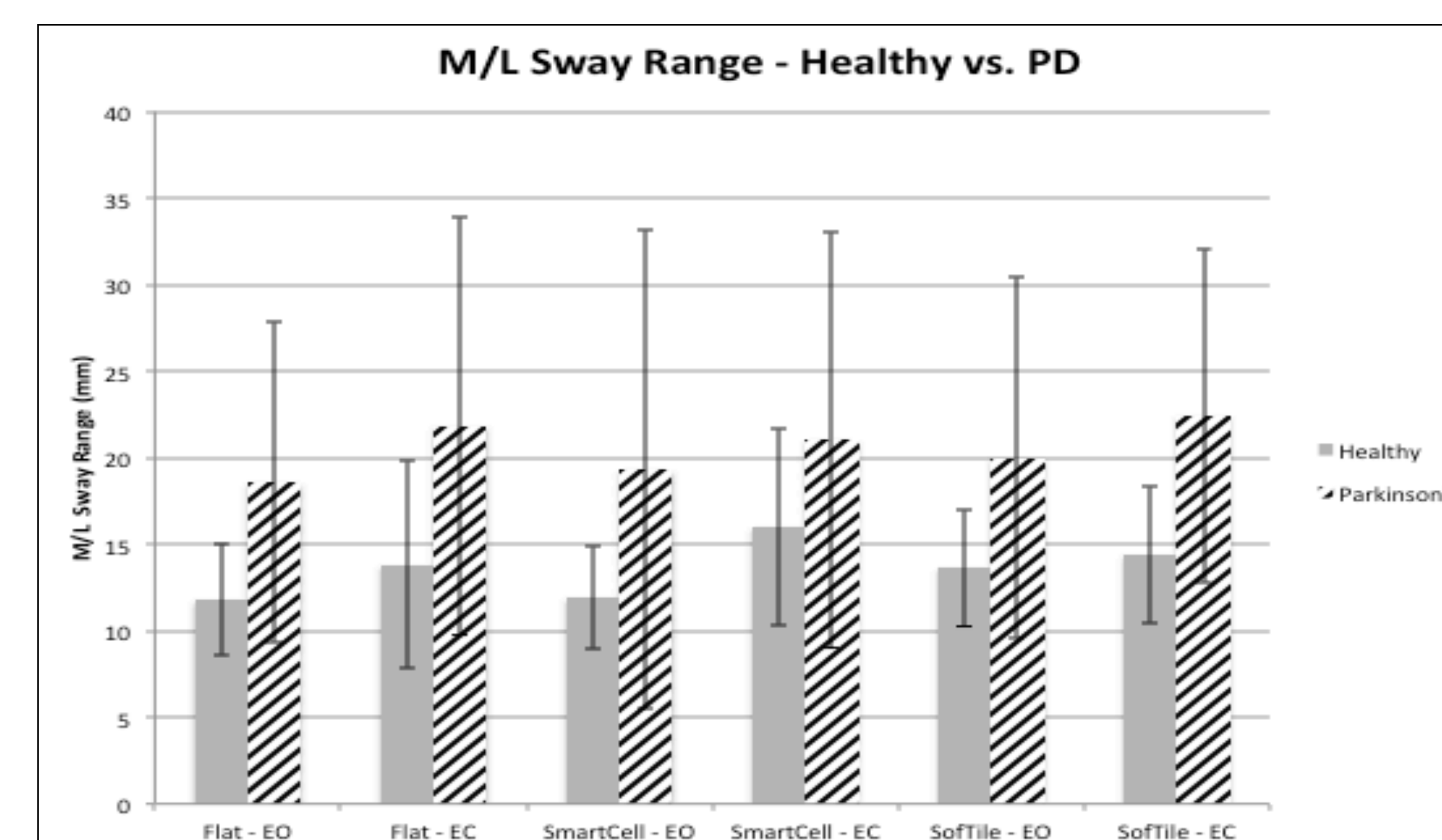
RESULTS

STATIC OLDER ADULTS VS. ADULTS WITH PD

- No statistically significant differences between groups, although trends showed slightly higher sway in Older Adults with PD as compared to Healthy Older Adults
- Pre-planned post hoc analysis showed significance within groups on flooring

		Flat-SmartCell	Flat-SoTile	SmartCell-SoTile
A/P Sway Range	Healthy	0.026 ^a	0.004 ^a	0.734
	PD	0.029 ^a	0.000 ^a	0.105
M/L Sway Range	Healthy	0.608	0.491	0.969
	PD	0.984	0.574	0.585
Mean Velocity	Healthy	0.826	0.087	0.176
	PD	0.240	0.005 ^a	0.120
Sway Area	Healthy	0.508	0.113	0.909
	PD	0.300	0.023 ^a	0.928

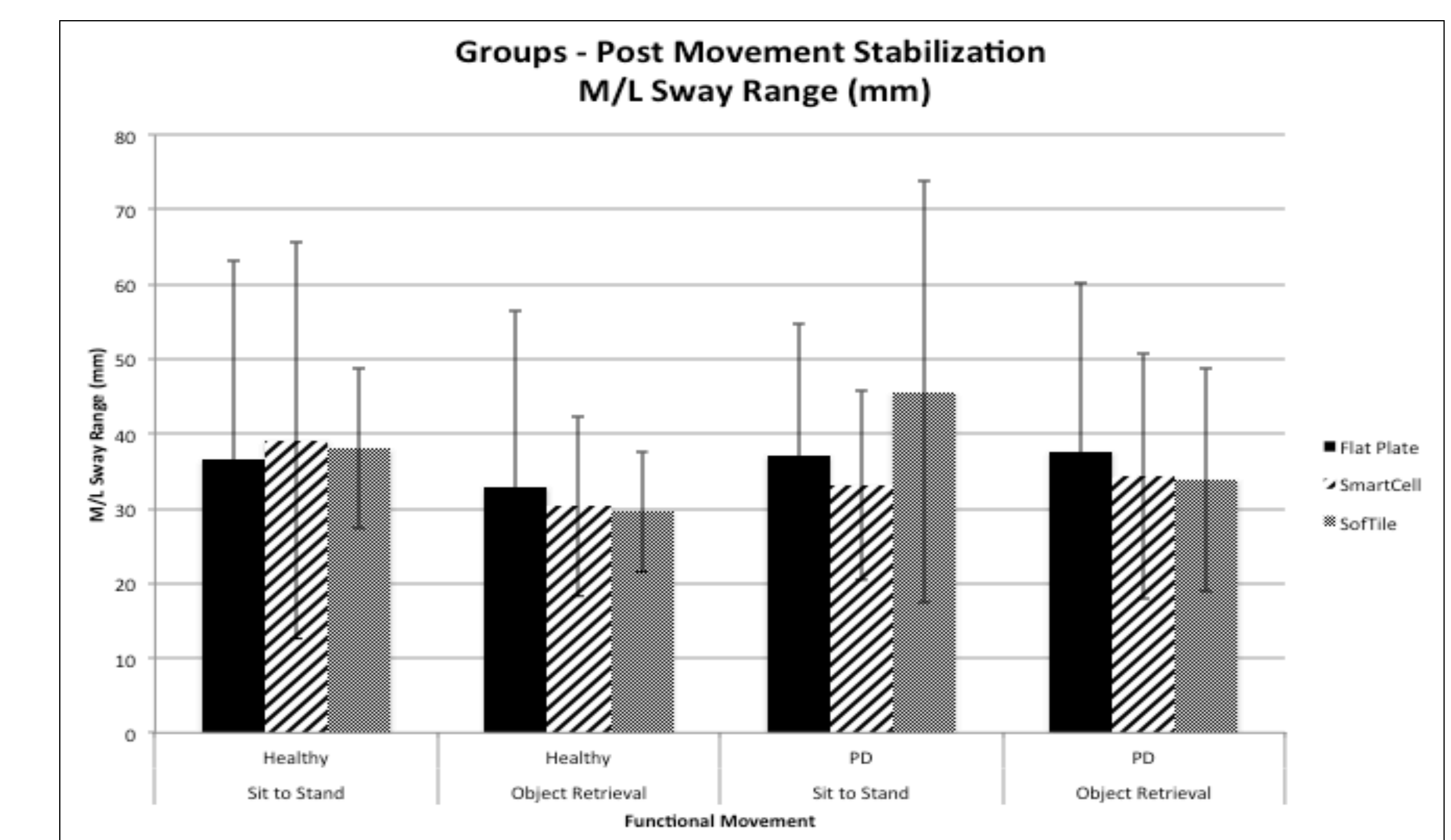
^a Denotes a statistically significant difference in flooring conditions ($p < 0.05$)



RESULTS CONTINUED...

IMMEDIATE STABILITY OF OLDER ADULTS VS. ADULTS WITH PD

- Main effect of Flooring*Group
- No statistically significant differences between different types of flooring during both tasks
 - High p-values with low observed power



CONCLUSIONS AND NEXT STEPS

- Compliant flooring may influence postural stability during quiet standing in the A/P direction
- Static posturography showed no statistically significant differences between diseases on the flooring
 - Flooring does not affect one population more than the other
- High variability observed in individuals with PD, perhaps based on disease severity
- As compared to healthy, even simple motor tasks (functional movements) can cause an increase in sway in PD
- The clinical and practical significance is yet to be determined
- Future work is also needed to determine whether those effects of the compliant flooring that significantly increased postural sway measures are of magnitude that they increase the likelihood an individual sustaining a fall

REFERENCES

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- Wright AD, Laing AC and Laing AC. *Accident Analysis and Prevention* 2011; **43**: 1480-1487